

SECTION 26 4313

TRANSIENT-VOLTAGE SUPPRESSION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

LANL MASTER SPECIFICATION

When editing to suit Project, author shall add job-specific requirements and delete only those portions that do not apply to the Project (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the Engineering Standards Manual (ESM) Electrical POC. Refer to http://engstandards.lanl.gov/engrman/HTML/poc_techcom1.htm#elec for the Engineering Standards Manual Personnel Link Index.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars" during editing.

Specification developed for ML-3 / ML-4 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

PART 1 GENERAL

Edit the following article to match Project requirements. Delete materials not applicable to Project.

1.1 SECTION INCLUDES

- A. Transient voltage surge suppressors (TVSSs) for power quality.

1.2 LANL PERFORMED WORK

- A. None

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01 3300:
- B. Catalog Data: Submit catalog data describing surge protective devices. Include data substantiating that materials comply with specified requirements.

1.4 QUALITY ASSURANCE

- A. Comply with the *National Electrical Code* (NEC) for components and installation.
- B. Provide products that are listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for the application, installation condition, and the environment in which installed.

- C. Manufacturer shall maintain an ISO 9000 certification.
- D. Provide products suitable for use at a nominal altitude of 7500 ft.

1.5 RECEIVING, STORING AND PROTECTING

- A. Receive, store, protect, and handle products according to NECA 1 *Standard Practices for Good Workmanship in Electrical Construction*.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Alternate products may be accepted, follow Section 01 2500.

Edit the following article to match Project requirements. Delete materials not applicable to Project.

2.2 TRANSIENT VOLTAGE SURGE SUPPRESSORS

- A. Provide transient voltage surge suppressors (TVSSs) suitable for the protection of electrical and electronic equipment.
- B. TVSSs shall be listed in accordance with UL 1449 Second Edition *Standard for Safety, Transient Voltage Surge Suppressors*, with product category guide index XUHT, and UL 1283 *Standard for Safety, Electromagnetic Interference Filters*.
- C. Provide TVSSs that have passed the UL 1449 Second Edition fault current test with ratings for the environments listed below using a standard 8x20 μ S waveform; submit documentation of tests by an independent testing laboratory:
 - 1. Service entrance applications (IEEE C62.41 Category C3): 240 kA per phase.
 - 2. Lighting and appliance branch circuit panelboard applications (IEEE C62.41 Category B3): 120 kA per phase.
- D. Provide TVSSs suitable for the nominal system voltage(s) indicated on the Drawings.
- E. Provide TVSSs with UL 1449 500-ampere suppressed voltage rating (SVR) not exceeding the following:

<u>System Voltage:</u>	<u>120/240V</u>	<u>208Y/120</u>	<u>480Y/277</u>	<u>480V delta</u>
SVR (L-N):	400 V	400 V	800V	1500V

F. Protection Modes:

1. For Wye configured system, furnish TVSS with suppression elements from each line to neutral (L-N), from each line and ground (L-G), and from neutral to ground (N-G).
2. For Delta configured system, furnish TVSS with suppression elements from each line to each line (L-L) and from each line to ground (L-G).

G. Provide TVSSs with 200 kA interrupting capacity internal fusing.

H. Provide TVSS designed to equally distribute surge current to matched Metal Oxide Varistor (MOV) components to ensure equal stressing and maximum performance.

I. Provide a monitoring system for each TVSS that performs the following functions:

1. Continuous monitoring of fusing system for each phase.
2. Monitor individual MOVs.
3. Monitor for overheating in each mode due to thermal runaway.
4. Furnish solid state indicator lights on each phase indicating open circuit damage, thermal conditions, and over-current.

Edit the following article to match Project requirements. Delete materials not applicable to Project.

J. Provide TVSS mounting as follows:

1. Integrated into service entrance [panelboard] [switchboard] [switchgear].
2. Integrated into isolated ground panelboards.
3. Designed for retrofit mounting immediately adjacent to protected [panelboard] [switchboard] [switchgear] with [NEMA 12] [NEMA 3R] [NEMA 4] enclosure.

K. Manufacturer: Cutler-Hammer "Clipper Power System", Square D "SURGELOGIC"

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify mounting area is ready for equipment.

- B. Verify that circuit rough-in is at correct location.

Edit article to match Project requirements. Delete materials not applicable to Project.

3.2 INSTALLATION

- A. Install surge protective devices where indicated on the Drawings and according to manufacturer's instructions and the *National Electrical Code*. Have the manufacturer's installation instructions available at the construction site.
- B. Install IEEE C62.41 Category C3 rated TVSS in the service equipment to protect each ungrounded conductor on the load side of the service entrance disconnecting means.
- C. Install IEEE C62.41 Category B3 or C1 rated TVSS in isolated ground power system branch circuit panelboards to protect each ungrounded conductor.
- D. Install each surge protective device so it will be accessible for inspection and maintenance and so the condition monitoring indicator will be visible without requiring the removal of cover plates.
- E. Install each surge protective device with minimum possible conductor length and a maximum conductor length of 18 inches.
1. Twist conductors tightly together and keep runs as straight as possible with no sharp bends or kinks.
 2. Use approved means to make connections from the surge protective device to conductors to be protected.
- F. Provide low-impedance grounding for surge protective devices.
1. Use approved means to make connections from the surge protective device to the point where the electrical power system grounded conductor is bonded to the grounding electrode conductor.
 2. If the surge protective device is more than 20 ft away from the electrical system bonding point, make one or more supplementary grounding electrode connections at the surge protective device location. Use the building "main grounding electrode ground bar", "main grounding electrode ground bar extensions", effectively grounded building structural steel, and grounded water pipes as supplementary grounding electrodes.
 3. Do not use a lightning protection system down conductor to ground a surge protective device.

3.3 FIELD QUALITY CONTROL

- A. Provide final protection and maintain conditions to ensure that coatings and finishes are without damage or deterioration at final inspection.
- B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- C. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.
- D. Verify that each surge protective device is correctly connected and that all condition monitoring indicators operate properly.

END OF SECTION

Do not delete the following reference information.

FOR LANL USE ONLY

This project specification is based on LANL Master Specification Section 26 4313 Rev. 0, dated February 24, 2006.